US008360130B2

(12) **United States Patent**
**Cannaverde et al.**

(10) **Patent No.: US 8,360,130 B2**
(45) **Date of Patent: Jan. 29, 2013**

(54) **ACTIVE TENSION DEVICE FOR A WINDOW COVERING**

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( * ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/071,556**

(22) Filed: **Mar. 25, 2011**

(65) **Prior Publication Data**

US 2011/0168338 A1 Jul. 14, 2011

**Related U.S. Application Data**

(63) Continuation of application No. 12/033,167, filed on Feb. 19, 2008, now Pat. No. 7,931,069.

(51) **Int. Cl.**

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|---|---|
| ***E06B 9/305*** | (2006.01) |
| ***E06B 9/386*** | (2006.01) |
| ***E06B 9/388*** | (2006.01) |
| ***E06B 9/00*** | (2006.01) |
| ***E06B 9/30*** | (2006.01) |
| ***A47H 1/00*** | (2006.01) |
| ***F16H 55/36*** | (2006.01) |

(52) **U.S. Cl.** ..... **160/173 R**; 160/178.1 R; 160/170; 160/321; 474/171

(58) **Field of Classification Search** ..... 160/168.1 R, 160/168.1 V, 173 R, 173 V, 178.1 R, 178.1 V, 160/84.04, 321, 24, 344; 474/171; 254/391, 254/392

See application file for complete search history.

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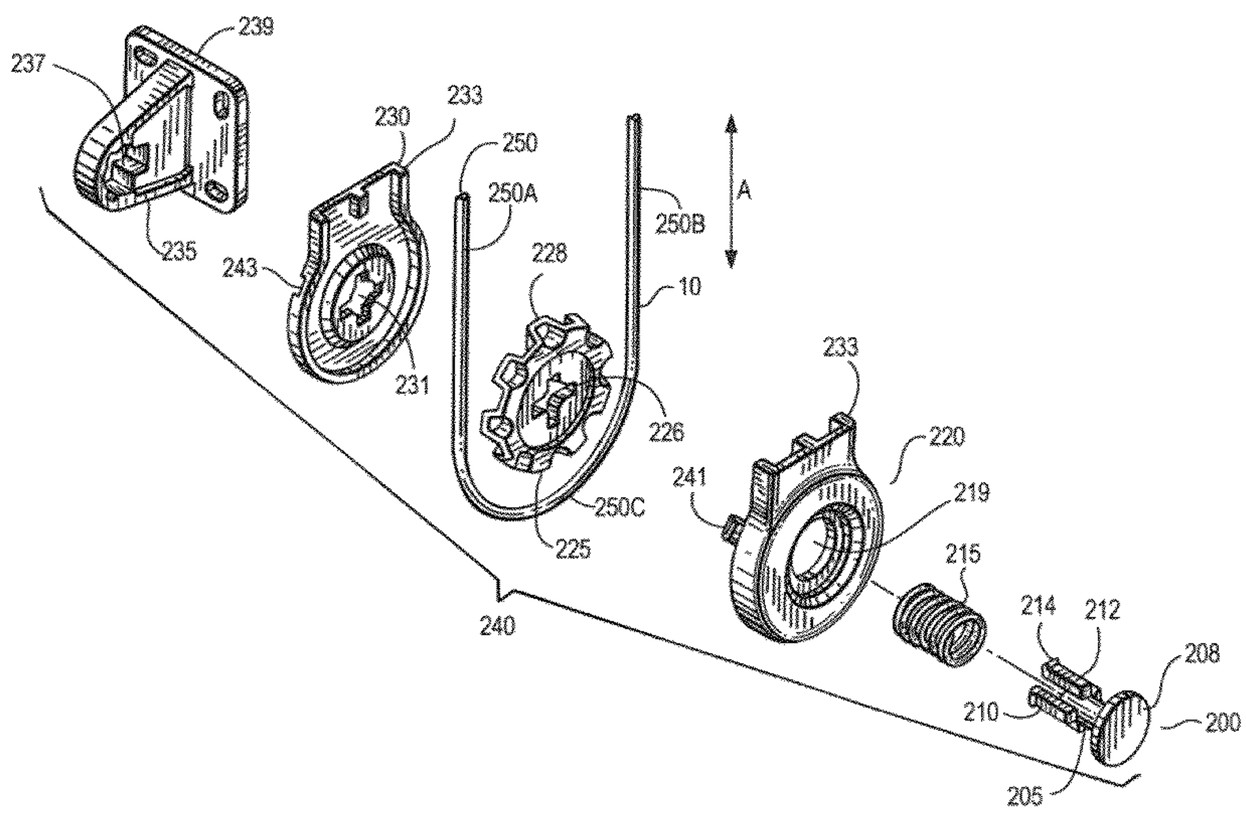
(57) **ABSTRACT**

A tension device that prevents a window covering from operating properly until the tension device is installed. The tension device incorporates a drive wheel, casing, anchoring arm and drive stud. The drive stud has two sections, one keyed and one cylindrical. Before the tension device is installed, the keyed section of the drive stud engages the drive wheel and the casing, thereby preventing them from rotating relative to each other. When the tension device is installed, the drive stud must be inserted into the anchoring arm causing the keyed section of the drive stud to disengage the drive wheel and thereby allow the drive wheel to rotate relative to the casing.

**3 Claims, 4 Drawing Sheets**



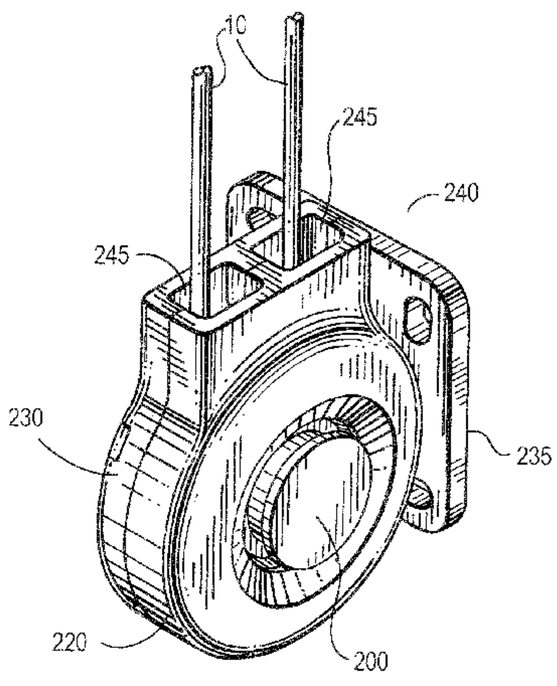



FIG. 1
(PRIOR ART)

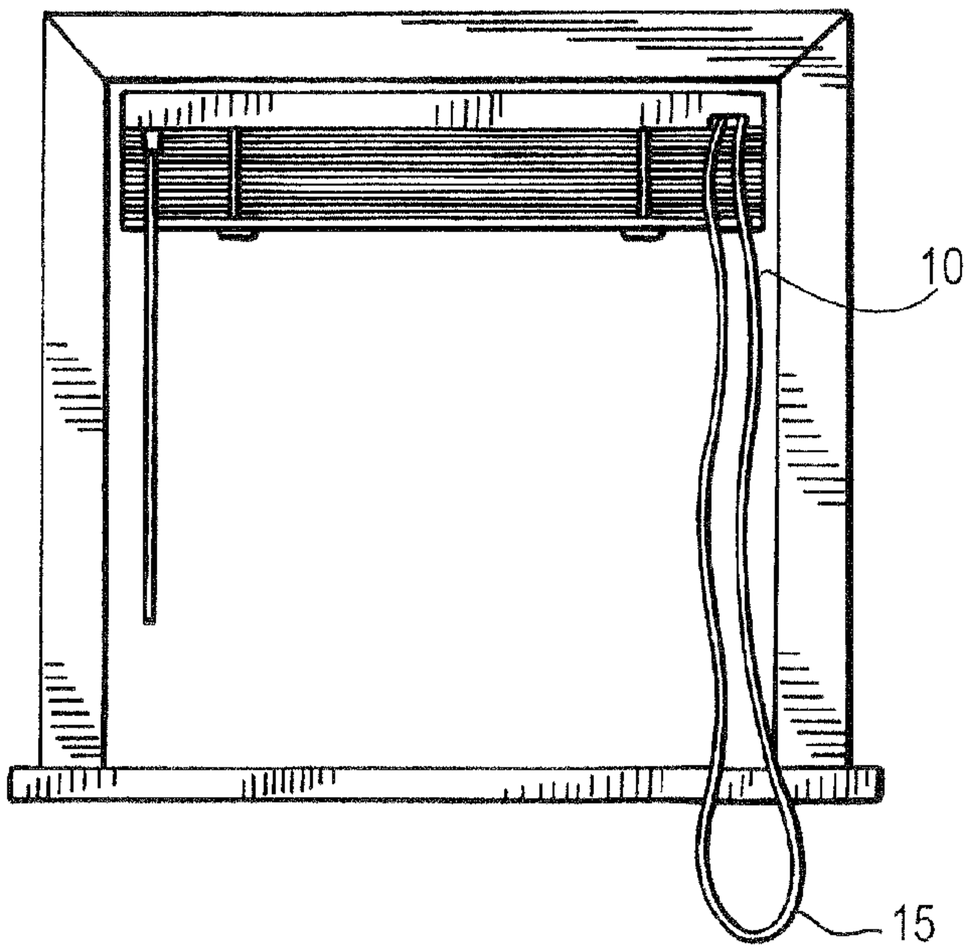



FIG. 2
(PRIOR ART)

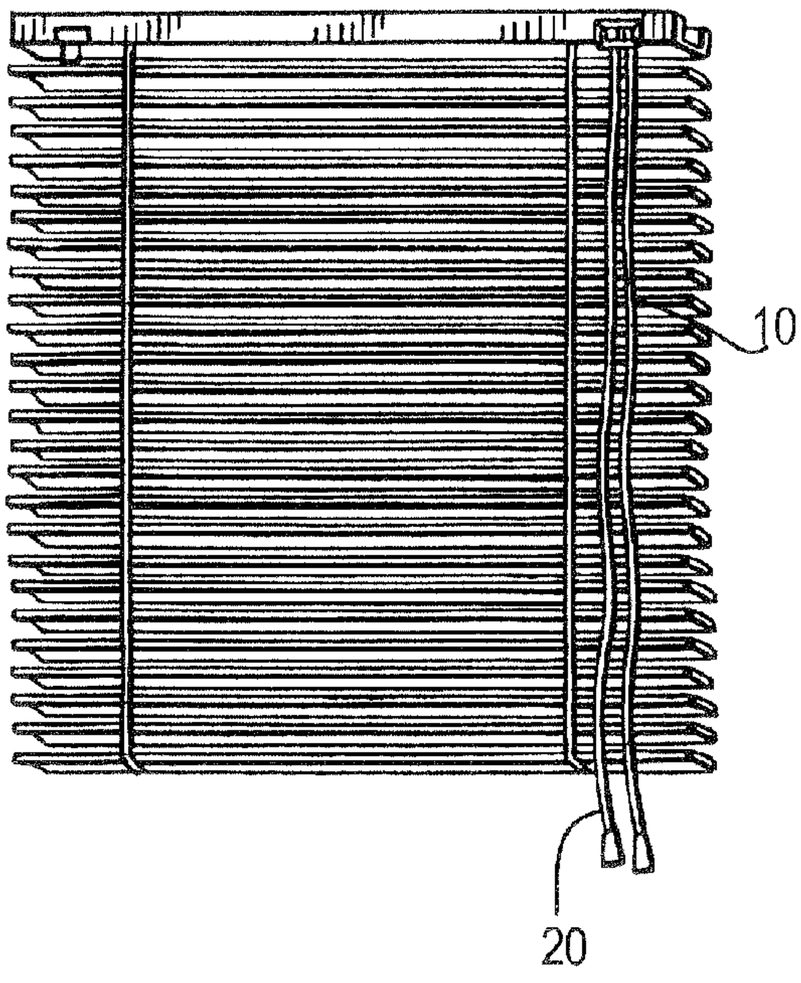
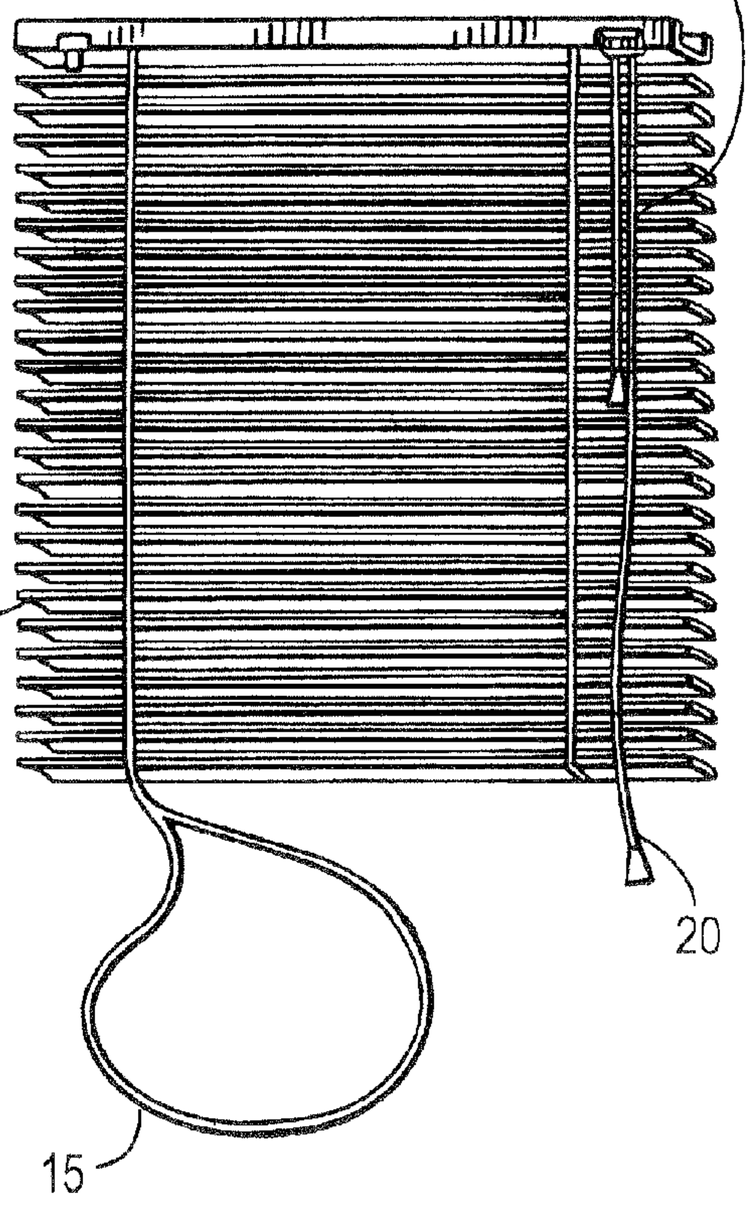



FIG. 3
(PRIOR ART)



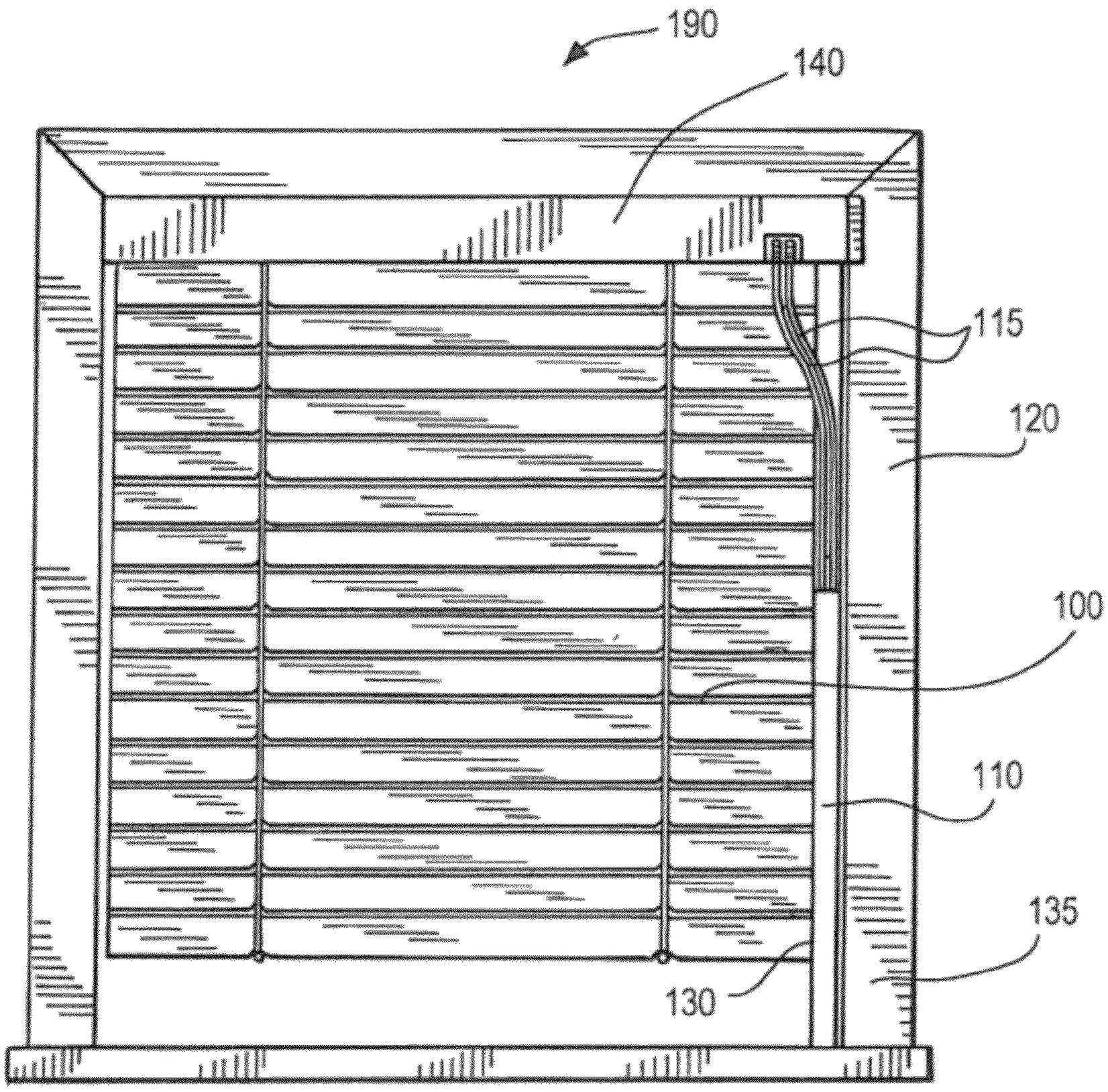
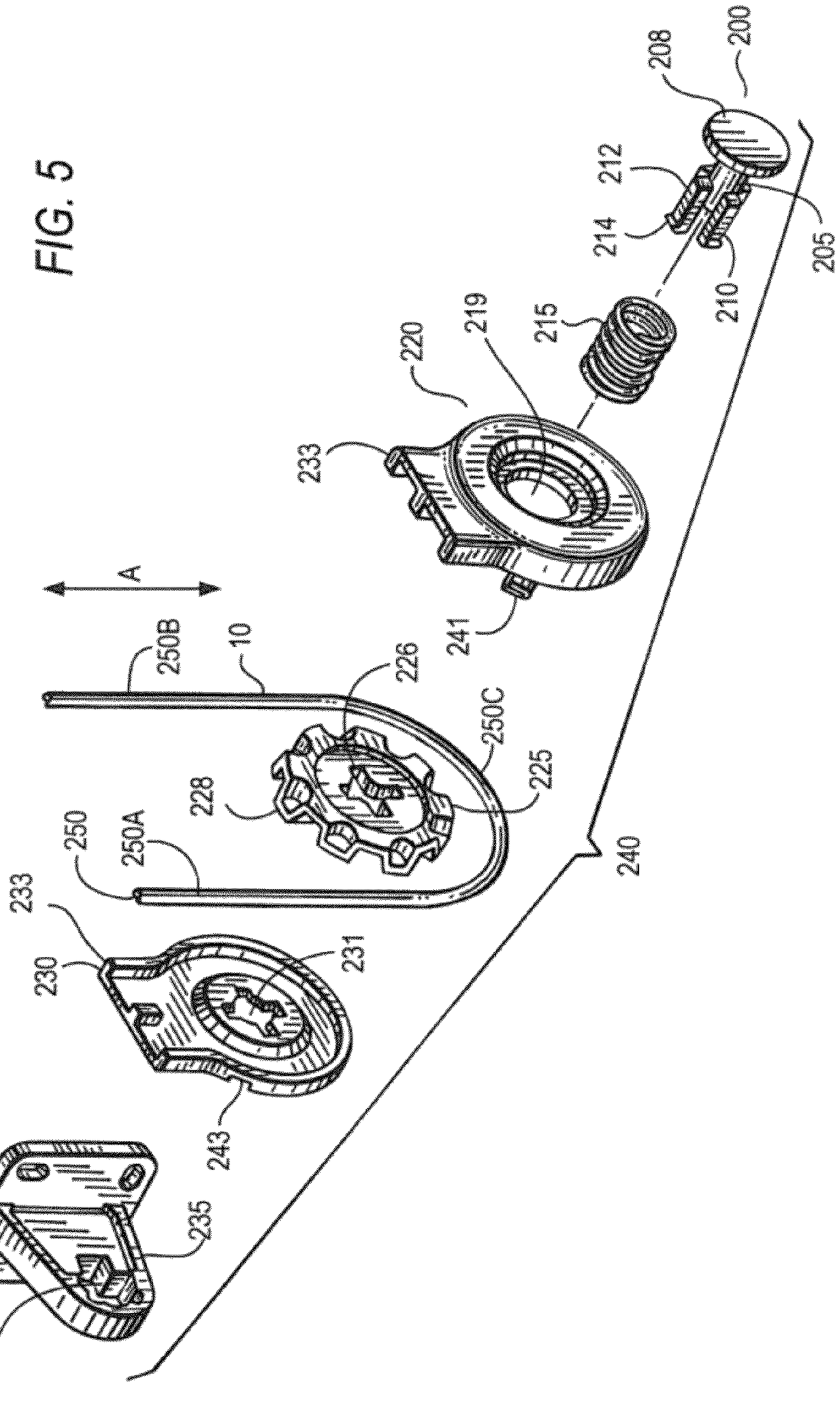



FIG. 4

FIG. 5


200
208
212
214
205
210
215
219
220
233
241
A
250B
10
226
250C
225
228
250
250A
240
230
231
243
239
235
237

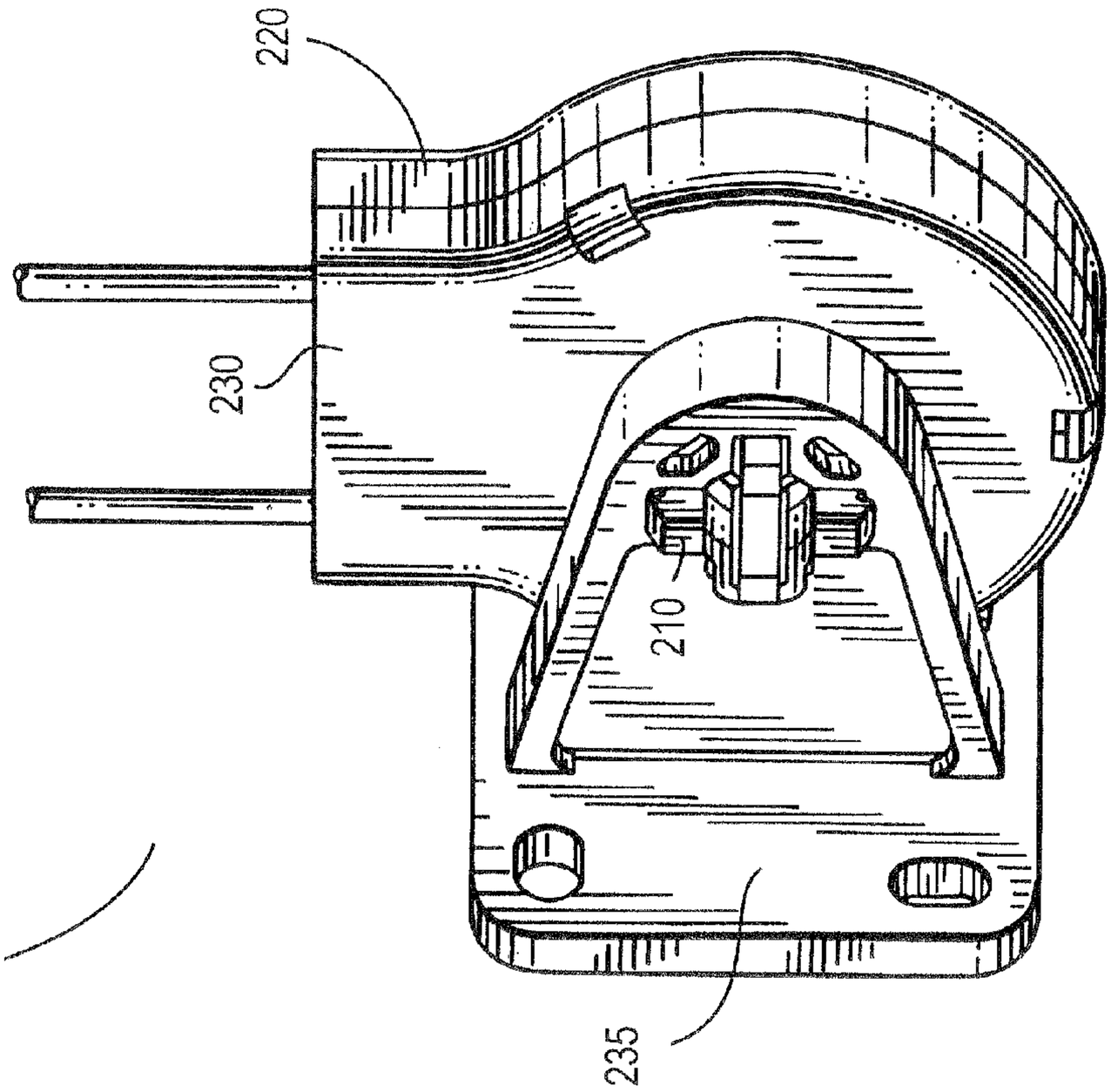



FIG. 7

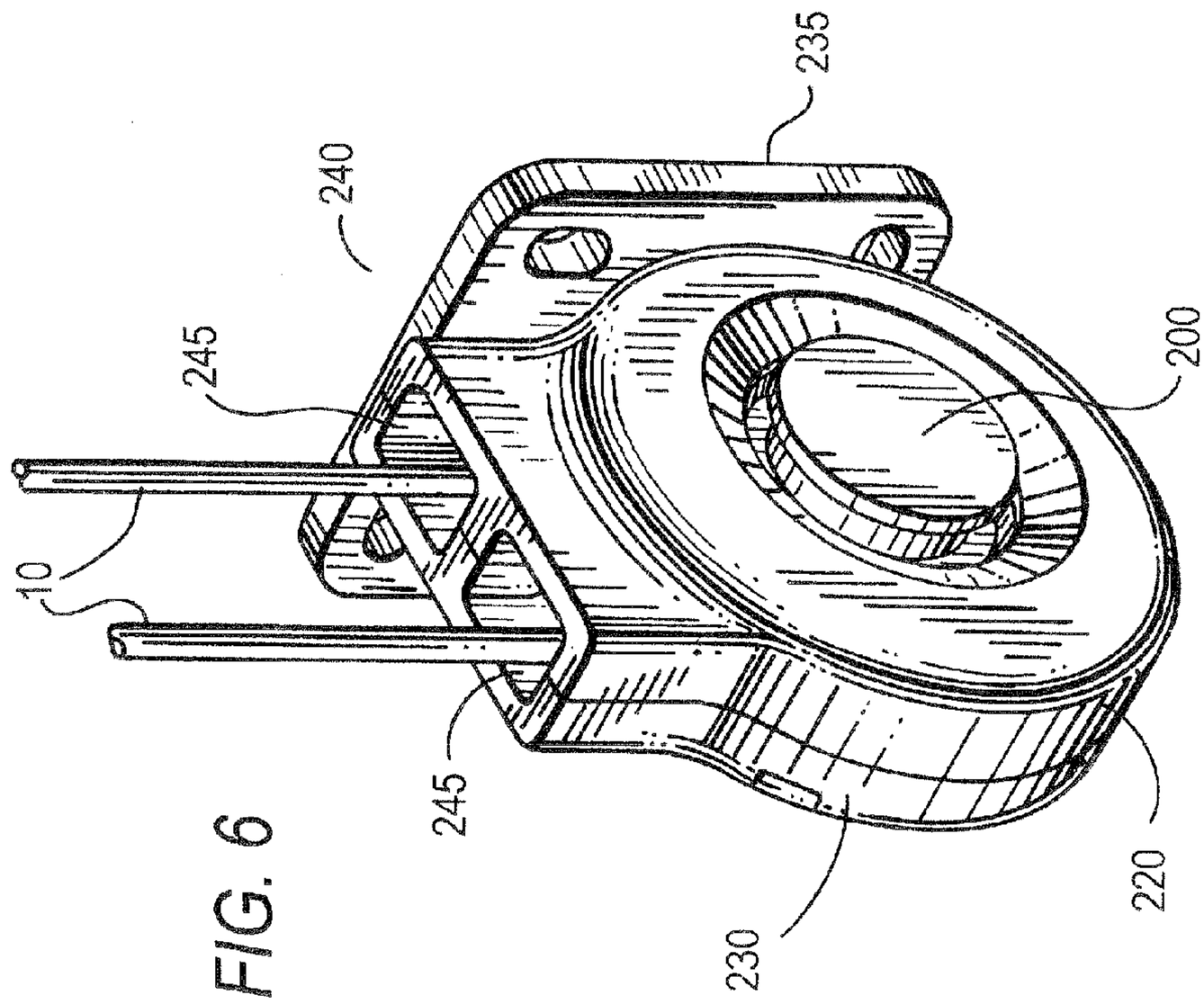



FIG. 6

# ACTIVE TENSION DEVICE FOR A WINDOW COVERING

This application is a continuation of U.S. Ser. No. 12/033,167, filed Feb. 19, 2008 now U.S. Pat. No. 7,931,069, the content of which is incorporated herein by reference.

## FIELD OF THE INVENTION

This application relates generally to a tension device for tensioning the cord used to operate a window covering, and more particularly to a tension device that is adapted to prevent the window covering from operating properly prior to installation of the tension device.

## BACKGROUND OF THE INVENTION

Modern window coverings can be raised and lowered for selectively blocking or filtering light in a room. A common method of achieving this result is through the use of one or more control cords. Some control cords have open ends, while others form a closed loop or end.

Both the closed end and open end control cords could be unsafe.

It is also possible for the cords on the opposite side of the control cord to become loose and create a loop large enough to fit the head of a child or pet as is shown in FIG. **3**.

One example of a prior art tension device is disclosed in U.S. Pat. No. 6,463,987 to Nevins. But there is a major drawback to the Nevins invention and other current tension devices. These tension devices need to be installed by the operator separately from the window covering itself. Often the operator, for whatever reason, installs the window covering without installing the tension device. When this happens, the advantages of the tension device are lost.

## SUMMARY OF THE INVENTION

The present invention provides a window covering with a tensioning device arranged so that the window covering is inoperable unless the tensioning device is properly installed. The tensioning device includes a drive mechanism with two different sections. A first section that is non-keyed and a second section that is keyed. The non-keyed section has fingers which are used to engage the drive wheel and casing and prevent relative rotation between those two elements. The non-keyed section is provided to allow relative rotation between the element it is engaged with and the element the keyed section is engaged with. This way, relative rotation of the wheel and casing can be allowed or prevented based on the positioning of a drive stud.

Before installation, a spring applies a force to the drive stud away from the direction in which it is inserted. This force keeps the drive stud in a position such that the keyed section of the drive stud is engaged with both the drive wheel and the back cover of the casing. The drive wheel is then prevented from rotating relative to the casing and therefore prevents the window covering from operating properly.

When the tension device is installed, a force is applied to the drive stud compressing the spring. This pushes the drive stud deeper into the device and then through the anchoring arm. Ramped ridges at the end of the fingers allow the fingers to pass through the specially designed hole in the anchoring arm, but not to pass back in the opposite direction. The drive stud is now in a position such that the keyed section is engaged with the anchoring arm and the back side of the outer



casing, but not the drive wheel. Therefore the drive wheel is free to rotate relative to the casing, allowing the window covering to operate properly.

## BRIEF DESCRIPTION OF THE FIGURES

To further satisfy the recited objectives, a detailed description of typical embodiments of the invention is provided with reference to appended drawings that are not intended to limit the scope of the invention, in which:

FIG. **1** is a front elevation view of a prior art window covering having a continuous loop for a control cord;

FIG. **2** is a front elevation view of a prior art window covering device having two control cords with open ends;

FIG. **3** is a front elevation view of a prior art system for controlling the window covering device of FIG. **2** showing a portion of a cord used to hold individual covering elements pulled into a loop;

FIG. **4** is a front elevation view of a prior art system for controlling a window covering device mounted adjacent to the window covering device;

FIG. **5** is an exploded view of the preferred embodiment of the tension device of the present invention;

FIG. **6** is a front perspective view of the preferred embodiment of the tension device of the present invention;

FIG. **7** is a rear perspective view of the preferred embodiment of the tension device of the present invention.

## DESCRIPTION OF THE INVENTION

FIG. **1** shows a known window covering where the control cord **10** is not attached to a tension control device. Instead, the cord is loose and forms a loop **15** at its lower most section.

FIG. **2** shows a known window covering with control cords **10** having two open ends **20**.

FIG. **3** shows another situation in which it is also possible for cords used to operate the window covering **33** may become loose and form a loop **15**.

FIG. **4** shows a prior art tensioning device for a window **190** with a window covering **100**, stationary member or frame **120** and a header **140**. This device incorporates a sleeve **110** having a lower end **130** attached to a lower part **135** of frame **120**. A control cord **115** from header **140** is encased in the sleeve **110** as shown. This system is effective at preventing a loop from forming in the control cords as seen in FIGS. **1-3**. But this system requires significant labor to be installed. The sleeve must be installed separately from the window covering and the window covering could be installed without the sleeve and still operate properly.

FIGS. **5-7** describe the preferred embodiment of the present invention. The tension device **240** includes a drive stud **200**. The drive stud comprises an end cap **208**, a non-keyed section **205**, a keyed section **210** and finger extensions **212**. The preferred embodiment of the keyed section is defined by fingers **212** (preferably four) that are located on the exterior of the keyed section **210**. These fingers **212** extend beyond the edge of the keyed section going away from the end cap **208**. At the far end of each finger **212** is an elevated ridge **214**. The elevated ridge **214** is sloped in the front. (The front being the section furthest from the end cap **208**). The ridges are shown in the shape of a ramp, but can be constructed in various embodiments. In between the keyed section and the end cap is the non-keyed section **205**. This section is preferably cylindrical, but can be constructed in other manners so long as its greatest radius is less than the smallest radius of the

holes **219**, **226**, **231**, **237** of a drive wheel or pulley **225**, a casing or housing **233** formed of two parts **220**, **230** and anchoring arm **235**.

While the preferred embodiment of the present invention is to use a four finger type keyed section, the keyed section can be constructed in numerous ways. The important aspect of the keyed section **210** is that this section has a maximum radius greater than the minimum radius of the center holes **219**, **226**, **231**, and **237**. Therefore when the keyed section **210** is inserted into the drive wheel **225**, the case **233** and/or the anchoring arm **235**, the drive stud **200** cannot rotate relative to the respective element(s). There are many possible configurations of the keyed section in addition to the one illustrated herein.

Further, the non-keyed section **205** is preferably cylindrical But the importance of this section is that when aligned with the drive wheel, this section does not engage the center hole **226** of the drive wheel **225**. A section that was not cylindrical, but had a cross section with a radius less than the minimum radius of the center hole **226** would be consistent with the present invention.

As shown in FIG. **5**, device **240** further includes a drive wheel **225** that has a hole in its center **226**. The hole **226** preferably has substantially the same shape and size as the cross section of the keyed section **212**. This allows the drive stud **200** to fit directly into the drive wheel **225**. Device **240** further includes a case **233** formed of a front section **220** with a hole **219** and a rear section **230**. The rear section **230** also has a hole **231** in it configured to fit the drive stud **200**. The hole **219** in the front section **220** to be large enough for the keyed section **210** to pass through, but small enough so that the end cap **208** does not pass through.

Before the tension device **240** is installed, the drive wheel **225** is encased between the rear section **230** and the front section **220**. The fingers **212** of drive stud **200** passes through the front section **220**, the drive wheel **225** and the rear section **230**. A spring **215** is provided to keep drive stud **200** in a precise position relative to the drive wheel **225** and outer case **233**. The spring **215** is disposed between the outside of the front section **220** and the end cap **208**, creating a repulsive force between those two surfaces. This force keeps the keyed section **210** of the drive stud **200** aligned with the drive wheel **225** and the rear section **230** prior to installation. Preferably the spring is a metal coil type spring, but it can be constructed of any material and configured in any manner such that it applies a repulsive force between the front section **220** and the end cap **208**.

In this configuration, the keyed section **210** of the drive stud **200** is engaged with both the drive wheel **225** and rear section **230**, thereby preventing the drive wheel **225** from rotating relative to the casing **233**.

The drive wheel **225** has spokes **228** that grip the cord of a window covering **10**. In order for the cord to move relative to the tension device **240**, the drive wheel **225** must rotate relative to the case **233**. As explained above, when the keyed section **210** of the drive stud **200** is engaged with the drive wheel **225** and the back side of the outer casing **230**, the drive wheel **225** cannot rotate relative to the back side of the outer casing **230**. Therefore, this configuration also prevents the cord **10** from moving relative to the tension device **240**.

Device **240** further includes an anchoring arm **235** with a bracket **239**. The anchoring arm **235** has a hole **237** in its center in the shape of the cross section of the keyed section **210** of the drive stud **200**. Initially, device **240** is shipped (normally together with the window covering) with the cord disposed partially within the case **233**. The cord is turned around the gear **228**. Prior to installation, the case **233** is separate from the anchoring arm **235**. Before completing the installation, the arm **235** is mounted on a flat (vertical) surface by bracket **239**. The last step of the installation consists of aligning the casing **233** with the anchoring arm **235** and applying a force to the end cap **208** causing the fingers **212** of the drive stud to pass through hole **237** in the center of the anchoring arm **235**. The fingers **212** are squeezed together as they pass through hole **237** because the ridges **214** are slightly wider than hole **237**. But because of the slanted nature of the ridges **214** and the flexibility of the fingers **212**, the fingers **212** are squeezed towards the center and pass through the hole.

FIG. **7** shows the preferred embodiment of the present invention with the drive stud **200** connecting the tension device to the anchoring arm **235**. The ridges **214** exit the back of the case **233** forming an interference fit between the drive stud **200** and the anchoring arm **235**. Thereby preventing the entire drive stud **200** from being removed from the anchoring arm **235** and keeping the drive stud **200** in a fixed position.

The elements of device **240** are sized and shaped so that prior to the mounting of the drive stud **200** into the anchoring arm **235**, the drive wheel **225** is immobilized. As the drive stud **200** is advanced through the case **233**, the fingers **212** extend outwardly of the case and into the anchoring arm **235**. The fingers **212** also move through and past the drive wheel **225**. Once passed through the hole **237**, the fingers are at a position where they engage the anchoring arm **235** and the rear section **230**, but do not engage the drive wheel **225**. The non-keyed section **205** of the drive stud **200** is now disposed within the hole **226** of the drive wheel **225**. The non-keyed section **205** is cylindrical with a radius less than the minimum radius of the hole **226**. This allows the drive wheel **225** to freely rotate (both clockwise and counter-clockwise) relative to the drive stud **200**, which is fixed relative to the case **233** and anchoring arm **235**. Since the drive wheel **225** can rotate freely, the cord and the window covering are free to operate properly. More particularly, the cord **10** includes a lower section **250** including two parallel portions **250**A, **250**B and an intermediate portion **250** C trained around the wheel **225** as shown. Once the case **233** is fully mounted on the anchoring arm **235**, the wheel **225** is free to rotate and hence the cord **10** can be moved up or down, as indicated by arrow A. The drive stud **200** thus forms a disabling mechanism that moves at an angle with respect to the cord parallel portions **250**A, **250**B and defines two configurations with the wheel **225**, with the wheel interfering with the movement of the cord in the first configuration and the cord being free to move with respect to the device **240** in the second configuration. As shown in the drawings, the two cord portions **250**A, **250**B define a plane with the drive stud moving at angle (that is substantially perpendicular to the plane between the two configurations.

FIGS. **6-7** show the tension device in use. FIG. **6** shows the drive stud **200** pass through the front section **220** and the rear section **230**. (The drive stud has been passed through the drive wheel **225**, but the drive wheel **225** is hidden from view when the front section **220** and rear section **230** are joined.) The control cords **10** wrap around the drive wheel **225** and pass through the two openings **245**.

In the preferred embodiment described herein, the front section **220** has two fingers **250** which protrude towards its inner side and are constructed of a flexible material. These fingers have ridges **252** with a slanted front, similar to fingers **212**. The rear section **230** has two holes **254** of substantially the same size as the fingers **250**. When the front section **220** and the rear section **230** are connected, the fingers **250** pass through the holes **254**. The ridges **252** protrude slightly beyond the holes **254**, but the slanted front of the ridges

causes the fingers to bend such that they can pass through the holes **254**. Once through the holes, the ridges create an interference fit between the front section **220** and the rear section **230**, thereby forming the case **233**.

FIG. **7** shows details of the ridges **214** at the end of the fingers **212**, protruding slightly beyond the hole in the back side of the outer casing **230** and hold the drive stud **200** in place against the force caused by the spring **215** (hidden in FIGS. **6-7**).

The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not as restrictive. The scope of the invention is, therefore, indicated by the appended claims and their combination in whole or in part rather than by the foregoing description. All changes that come within the meaning and range of equivalency of the claims are to be embraced within their scope.

The invention claimed is:

**1**. A window treatment system attached to a stationary member, said system comprising:

a window covering adapted for mounting on the stationary member;

a control cord selectively operating said window covering and including a lower section with two parallel portions defining a plane and being connected by an intermediate portion; and

a tensioning device selectively applying a tension on said cord, when attached to the stationary member, said tensioning device including a cord receiving member with said intermediate portion being in contact with said cord receiving member and a disabling mechanism defining with said cord receiving member a first configuration in which said cord is prevented from moving with respect to said tensioning device when said tensioning device is detached from the stationary member;

said disabling mechanism and said cord receiving member defining a second configuration when said tensioning device is attached to said stationary member, in which second configuration said control cord is allowed to move with respect to said tensioning device when said tensioning device is attached to the stationary member, said disabling mechanism moving substantially perpendicularly with respect to said plane between said first and second configurations;

wherein said intermediate portion being trained around the cord receiving member, and wherein said disabling mechanism is a drive stud moving perpendicularly with respect to said parallel portions between said two configurations;

wherein said drive stud forms an axis of rotation for said cord receiving member in said second configuration.

**2**. The window treatment system of claim **1** further comprising an attaching member selectively attaching said tensioning device to said stationary member.

**3**. A tension device adapted to restrict the operation of a window covering unit prior to installation to a frame, the window covering including a control cord, comprising:

a cord receiving member receiving a portion of said cord, including a wheel engaging said portion;

a housing receiving said cord receiving member, said housing being selectively attachable to the frame; and

a locking member disposed at least partially in said housing and having a first and a second configuration dependent on position of said housing, said locking member being in said first configuration when said housing is not attached in which said first configuration said wheel and said locking member are interlocked and said wheel is prevented by said locking member from rotation and thereby interferes with the movement of the cord; and said locking member being in said second configuration when said housing is attached to said frame, in which said second configuration said locking member being disengaged from said wheel to allow said wheel to rotate and thereby not interfere with the movement of the cord;

wherein the cord includes two parallel portions connected by an intermediate portion and defining a plane, the intermediate portion being trained around the wheel, and wherein said locking member is moving substantially perpendicularly to said plane between said first and second configurations;

wherein said intermediate portion being trained around the wheel, and wherein said locking member is a drive stud moving perpendicularly with respect to said parallel portions between said two configurations;

wherein said drive stud forms an axis of rotation for said wheel in said second configuration.

* * * * *